

WHAT IS CLAIMED IS

1. A method for representing a state of a process in a data representation language in
5 a distributed computing environment, the method comprising:

executing the process within a first device;

10 converting a current computation state of the process into a data representation
language representation of the current computation state, wherein the
computation state of the process comprises information about the
execution state of the process within the first device; and

15 storing the data representation language representation of the current computation
state of the process;

20 wherein the data representation language representation of the current
computation state of the process is configured for use in reconstituting the
process and resuming execution of the process.

2. The method as recited in claim 1, wherein the data representation language
representation of the current computation state of the process is stored to a space using a
space service, wherein the space is operable to store documents including data
representation language documents in the distributed computing environment, and
25 wherein the space service is operable to store and retrieve documents to the space for
processes in the distributed computing environment.

3. The method as recited in claim 2, wherein said storing the data representation
language representation of the current computation state of the process comprises sending

the data representation language representation to the space service in one or more messages.

4. The method as recited in claim 3, wherein the one or more messages are in the data representation language.

5. The method as recited in claim 1, further comprising:

a second device accessing the stored data representation language representation of the current computation state of the process;

reconstituting the process at the current computation state within the second device from the data representation language representation of the current computation state of the process; and

resuming execution of the process within the second device from the current computation state.

6. The method as recited in claim 5,

wherein the data representation language representation of the current computation state of the process is stored to a space using a space service, wherein the space is operable to store documents including data representation language documents in the distributed computing environment, wherein the space service is operable to store and retrieve documents to the space for processes in the distributed computing environment; and

wherein said accessing the data representation language representation of the current computation state of the process comprises receiving the data

representation language representation from the space service in one or more messages.

7. The method as recited in claim 6, wherein the one or more messages are in the
5 data representation language.

8. The method as recited in claim 5, further comprising:

generating an advertisement for the data representation language representation of
10 the current computation state of the process, wherein the advertisement
comprises information to enable access to the stored data representation
language representation, and wherein the second device accessing the
stored data representation language representation comprises:

15 the second device accessing the advertisement for the stored data
representation language representation; and

the second device locating the stored data representation language
representation using the information in the advertisement.

20 9. The method as recited in claim 8,

wherein the advertisement for the data representation language representation of
the current computation state of the process is stored to a space using a
25 space service, wherein the space is operable to store documents including
advertisements in the distributed computing environment, and wherein the
space service is operable to store and retrieve documents to the space for
processes in the distributed computing environment; and

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wherein said accessing the advertisement comprises retrieving the advertisement from the space using the space service.

10. The method as recited in claim 1, further comprising:

ending execution of the process within the first device;

the first device accessing the stored data representation language representation of the current computation state of the process from the space service;

reconstituting the process at the current computation state within the first device from the data representation language representation of the current computation state of the process; and

resuming execution of the process within the first device from the current computation state.

11. The method as recited in claim 1, wherein the current computation state of the process includes one or more threads of the process, and wherein said converting a current computation state of the process into a data representation language representation of the current computation state comprises:

including information describing the one or more threads in the data representation language representation of the current computation state, wherein the information describing the one or more threads is configured for use in restarting the one or more threads when resuming execution of the process

12. The method as recited in claim 1, wherein the current computation state of the process includes one or more leases to services held by the process, and wherein said

converting a current computation state of the process into a data representation language representation of the current computation state comprises:

5 including information describing the one or more leases in the data representation language representation of the current computation state, wherein the information describing the one or more leases is configured for use in reestablishing the one or more leases to services for the process when resuming execution of the process.

10 13. The method as recited in claim 1, wherein the current computation state of the process includes one or more objects of the process, wherein an object is an instance of a class in a computer programming language, and wherein said converting a current computation state of the process into a data representation language representation of the current computation state comprises:

15 converting the one or more objects into data representation language representations of the one or more objects; and

20 including the data representation language representations of the one or more objects in the data representation language representation of the current computation state of the process;

25 wherein the data representation language representations of the one or more objects are configured for use in generating copies of the one or more objects.

14. The method as recited in claim 13, wherein said computer programming language is the Java programming language.

15. The method as recited in claim 1, wherein the current computation state of the process includes:

one or more threads of the process;

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one or more leases to services held by the process; and

one or more objects of the process, wherein an object is an instance of a class in a computer programming language;

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wherein said converting a current computation state of the process into a data representation language representation of the current computation state comprises:

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including information describing the one or more threads in the data representation language representation of the current computation state, wherein the information describing the one or more threads is configured for use in restarting the one or more threads when resuming execution of the process;

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including information describing the one or more leases in the data representation language representation of the current computation state, wherein the information describing the one or more leases is configured for use in reestablishing the one or more leases to services for the process when resuming execution of the process;

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converting the one or more objects into data representation language representations of the one or more objects; and

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including the data representation language representations of the one or more objects in the data representation language representation of the current computation state of the process, wherein the data representation language representations of the one or more objects are configured for use in generating copies of the one or more objects.

16. The method as recited in claim 1, wherein the process is executing within a virtual machine executing within the first device.

17. The method as recited in claim 16, wherein the virtual machine is a Java Virtual Machine (JVM).

18. The method as recited in claim 1, wherein said data representation language is eXtensible Markup Language (XML).

19. A method for representing a state of a process in a data representation language in a distributed computing environment, the method comprising:

executing the process within a first device;

converting a current computation state of the process into a data representation language representation of the current computation state, wherein the computation state of the process comprises information about the execution state of the process within the first device;

sending the data representation language representation of the current computation state of the process to a second device;

reconstituting the process at the current computation state within the second device from the data representation language representation of the current computation state of the process; and

5 resuming execution of the process within the second device from the current computation state.

20. The method as recited in claim 19, wherein said sending the data representation language representation of the current computation state of the process to a second device
10 comprises sending the data representation language representation in one or more messages to the second device.

21. The method as recited in claim 20, wherein the one or more messages are in the data representation language.
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22. The method as recited in claim 19, wherein the current computation state of the process includes:

20 one or more threads of the process;

 one or more leases to services held by the process; and

 one or more objects of the process, wherein an object is an instance of a class in a computer programming language.
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23. The method as recited in claim 19, wherein said converting a current computation state of the process into a data representation language representation of the current computation state comprises:

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5 including information describing the one or more threads in the data representation language representation of the current computation state, wherein the information describing the one or more threads is configured for use in restarting the one or more threads when resuming execution of the process;

10 including information describing the one or more leases in the data representation language representation of the current computation state, wherein the information describing the one or more leases is configured for use in reestablishing the one or more leases to services for the process when resuming execution of the process;

15 converting the one or more objects into data representation language representations of the one or more objects; and

20 including the data representation language representations of the one or more objects in the data representation language representation of the current computation state of the process, wherein the data representation language representations of the one or more objects are configured for use in generating copies of the one or more objects.

25 24. The method as recited in claim 19, wherein the process is executing within a first virtual machine executing within the first device, and wherein the process is reconstituted and execution is resumed within a second virtual machine executing within the second device.

25 25. The method as recited in claim 24, wherein the first virtual machine and the second virtual machine are Java Virtual Machines (JVMs).

26. The method as recited in claim 19, wherein said data representation language is eXtensible Markup Language (XML).

5 27. A distributed computing system for representing a state of a process in a data representation language comprising:

a first device operable to execute the process;

10 a second device comprising:

a space operable to store documents including data representation language documents in the distributed computing system; and

15 a space service operable to store and retrieve documents to the space for processes in the distributed computing environment;

wherein the first device is configured to:

20 convert a current computation state of the process into a data representation language representation of the current computation state, wherein the computation state of the process comprises information about the execution state of the process within the first device; and

25 send the data representation language representation of the current computation state of the process to the space service;

30 wherein the space service is operable to store the data representation language representation of the current computation state of the process to the space;

and wherein the data representation language representation of the current computation state of the process is configured for use in reconstituting the process and resuming execution of the process.

5 28. The system as recited in claim 27, wherein the data representation language representation of the current computation state of the process is sent to the space service in one or more messages.

10 29. The system as recited in claim 28, wherein the one or more messages are in the data representation language.

30. The system as recited in claim 27, further comprising:

a third device configured to:

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retrieve the stored data representation language representation of the current computation state of the process from the second device;

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reconstitute the process at the current computation state from the data representation language representation of the current computation state of the process; and

resume execution of the process from the current computation state.

25 31. The system as recited in claim 30, wherein, in said retrieving, the data representation language representation of the current computation state of the process is received from the space service in one or more messages.

30 32. The system as recited in claim 31, wherein the one or more messages are in the data representation language.

33. The system as recited in claim 27,

wherein the first device is further configured to:

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end execution of the process;

retrieve the stored data representation language representation of the
current computation state of the process from the second device;

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reconstitute the process at the current computation state within the first
device from the data representation language representation of the
current computation state of the process; and

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resume execution of the process within the first device from the current
computation state.

34. The system as recited in claim 27, wherein the current computation state of the
process includes one or more threads of the process, and wherein, in said converting a
current computation state of the process into a data representation language representation
of the current computation state, the first device is further configured to:

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include information describing the one or more threads in the data representation
language representation of the current computation state, wherein the
information describing the one or more threads is configured for use in
restarting the one or more threads when resuming execution of the process

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35. The system as recited in claim 27, wherein the current computation state of the
process includes one or more leases to services held by the process, and wherein, in said

converting a current computation state of the process into a data representation language representation of the current computation state, the first device is further configured to:

5 include information describing the one or more leases in the data representation language representation of the current computation state, wherein the information describing the one or more leases is configured for use in reestablishing the one or more leases to services for the process when resuming execution of the process.

10 36. The system as recited in claim 27, wherein the current computation state of the process includes one or more objects of the process, wherein an object is an instance of a class in a computer programming language, and wherein, in said converting a current computation state of the process into a data representation language representation of the current computation state, the first device is further configured to:

15 convert the one or more objects into data representation language representations of the one or more objects; and

20 include the data representation language representations of the one or more objects in the data representation language representation of the current computation state of the process;

25 wherein the data representation language representations of the one or more objects are configured for use in generating copies of the one or more objects.

37. The system as recited in claim 36, wherein said computer programming language is the Java programming language.

38. The system as recited in claim 27, further comprising a virtual machine executable within the first device, wherein the process is executable within the virtual machine on the first device.

5 39. The system as recited in claim 38, wherein the virtual machine is a Java Virtual Machine (JVM).

40. The system as recited in claim 27, wherein said data representation language is eXtensible Markup Language (XML).

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41. A distributed computing system for representing a state of a process in a data representation language comprising:

15 a first device operable to execute the process, wherein the first device is configured to:

convert a current computation state of the process into a data representation language representation of the current computation state, wherein the computation state of the process comprises information about the execution state of the process within the first device;

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store the data representation language representation of the current computation state of the process; and

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generate an advertisement for the stored data representation language representation, wherein the advertisement comprises information to enable access to the stored data representation language representation.

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wherein the data representation language representation of the current computation state of the process is configured for use in reconstituting the process and resuming execution of the process.

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42. The system as recited in claim 41, further comprising:

a second device comprising:

10 a space operable to store documents including data representation language documents in the distributed computing system; and

a space service operable to store and retrieve documents to the space for processes in the distributed computing environment;

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wherein the first device is further configured to send the advertisement for the stored data representation language representation to the space service; and

wherein the space service is configured to store the advertisement for the stored data representation language representation to the space.

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43. The system as recited in claim 42, further comprising:

a third device configured to:

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retrieve the advertisement for the stored data representation language representation from the second device;

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retrieve the located stored data representation language representation of the current computation state of the process using the information in the advertisement;

5 reconstitute the process at the current computation state from the data representation language representation of the current computation state of the process; and

resume execution of the process from the current computation state.

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44. A distributed computing system for migrating a state of a process in a data representation language comprising:

15 a first device operable to execute the process; and

a second device;

wherein the first device is configured to:

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convert a current computation state of the process into a data representation language representation of the current computation state, wherein the computation state of the process comprises information about the execution state of the process within the first device; and

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send the data representation language representation of the current computation state of the process to the second device;

30 wherein the second device is configured to:

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receive the data representation language representation of the current
computation state of the process from the first device;

5 reconstitute the process at the current computation state from the data
representation language representation of the current computation
state of the process; and

resume execution of the process from the current computation state.

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45. The system as recited in claim 44, wherein the data representation language
representation of the current computation state of the process is sent to the second device
in one or more messages.

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46. The system as recited in claim 45, wherein the one or more messages are in the
data representation language.

47. The system as recited in claim 44, wherein the current computation state of the
process includes:

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one or more threads of the process;

one or more leases to services held by the process; and

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one or more objects of the process, wherein an object is an instance of a class in a
computer programming language;

wherein, in said converting a current computation state of the process into a data
representation language representation of the current computation state,
30 the first device is further configured to:

5 include information describing the one or more threads in the data representation language representation of the current computation state, wherein the information describing the one or more threads is configured for use in restarting the one or more threads when resuming execution of the process;

10 include information describing the one or more leases in the data representation language representation of the current computation state, wherein the information describing the one or more leases is configured for use in reestablishing the one or more leases to services for the process when resuming execution of the process;

15 convert the one or more objects into data representation language representations of the one or more objects; and

20 include the data representation language representations of the one or more objects in the data representation language representation of the current computation state of the process, wherein the data representation language representations of the one or more objects are configured for use in generating copies of the one or more objects.

25 48. The system as recited in claim 44, further comprising a first virtual machine executable within the first device and a second virtual machine executable within the second device, wherein the process is executable within the first virtual machine on the first device and wherein the process is reconstituted and executed within the second virtual machine on the second device.

49. The system as recited in claim 48, wherein the first virtual machine and the second virtual machine are Java Virtual Machines (JVMs).

50. The system as recited in claim 44, wherein said data representation language is
5 eXtensible Markup Language (XML).

51. A carrier medium comprising program instructions, wherein the program instructions are computer-executable to implement:

10 converting a current computation state of a process executing within a first device
into a data representation language representation of the current
computation state, wherein the computation state of the process comprises
information about the execution state of the process within the first device;
15 and

storing the data representation language representation of the current computation
state of the process;

20 wherein the data representation language representation of the current
computation state of the process is configured for use in reconstituting the
process and resuming execution of the process.

52. The carrier medium as recited in claim 51, wherein the data representation
25 language representation of the current computation state of the process is stored to a
space using a space service, wherein the space is operable to store documents including
data representation language documents in the distributed computing environment, and
wherein the space service is operable to store and retrieve documents to the space for
processes in the distributed computing environment.

53. The carrier medium as recited in claim 52, wherein, in said storing the data representation language representation of the current computation state of the process, the program instructions are further computer-executable to implement sending the data representation language representation to the space service in one or more messages in the data representation language.

54. The carrier medium as recited in claim 51, wherein the program instructions are further computer-executable to implement:

a second device accessing the stored data representation language representation of the current computation state of the process;

reconstituting the process at the current computation state within the second device from the data representation language representation of the current computation state of the process; and

resuming execution of the process within the second device from the current computation state.

55. The carrier medium as recited in claim 54,

wherein the data representation language representation of the current computation state of the process is stored to a space using a space service, wherein the space is operable to store documents including data representation language documents in the distributed computing environment, and wherein the space service is operable to store and retrieve documents to the space for processes in the distributed computing environment; and

wherein, in said accessing the data representation language representation of the

current computation state of the process, the program instructions are further computer-executable to implement receiving the data representation language representation from the space service in one or more messages in the data representation language.

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56. The carrier medium as recited in claim 54, wherein the program instructions are further computer-executable to implement:

generating an advertisement for the data representation language representation of
the current computation state of the process, wherein the advertisement
comprises information to enable access to the stored data representation
language representation, and wherein the second device accessing the
stored data representation language representation comprises:

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the second device accessing the advertisement for the stored data
representation language representation; and

the second device locating the stored data representation language
representation using the information in the advertisement.

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57. The carrier medium as recited in claim 56,

wherein the advertisement for the data representation language representation of
the current computation state of the process is stored to a space using a
space service, wherein the space is operable to store documents including
advertisements in the distributed computing environment, and wherein the
space service is operable to store and retrieve documents to the space for
processes in the distributed computing environment; and

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wherein, in said accessing the advertisement, the program instructions are further computer-executable to implement retrieving the advertisement from the space using the space service.

- 5 58. The carrier medium as recited in claim 51, wherein the program instructions are further computer-executable to implement:

ending execution of the process within the first device;

- 10 the first device accessing the stored data representation language representation of the current computation state of the process from the space service;

- reconstituting the process at the current computation state within the first device from the data representation language representation of the current computation state of the process; and
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resuming execution of the process within the first device from the current computation state.

- 20 59. The carrier medium as recited in claim 51, wherein the process is executing within a Java Virtual Machine executing within the first device.

60. The carrier medium as recited in claim 51, wherein said data representation language is eXtensible Markup Language (XML).
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61. A carrier medium comprising program instructions, wherein the program instructions are computer-executable to implement:

- 30 executing the process within a first device;

converting a current computation state of the process into a data representation language representation of the current computation state, wherein the computation state of the process comprises information about the execution state of the process within the first device;

sending the data representation language representation of the current computation state of the process to a second device;

reconstituting the process at the current computation state within the second device from the data representation language representation of the current computation state of the process; and

resuming execution of the process within the second device from the current computation state.

62. The carrier medium as recited in claim 61, wherein, in said sending the data representation language representation of the current computation state of the process to a second device, the program instructions are further computer-executable to implement sending the data representation language representation in one or more messages to the second device.

63. The carrier medium as recited in claim 62, wherein the one or more messages are in the data representation language.

64. The carrier medium as recited in claim 61, wherein the current computation state of the process includes:

one or more threads of the process;

one or more leases to services held by the process; and

one or more objects of the process, wherein an object is an instance of a class in a
computer programming language; and

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wherein the program instructions are further computer-executable to implement:

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including information describing the one or more threads in the data
representation language representation of the current computation
state, wherein the information describing the one or more threads is
configured for use in restarting the one or more threads when
resuming execution of the process;

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including information describing the one or more leases in the data
representation language representation of the current computation
state, wherein the information describing the one or more leases is
configured for use in reestablishing the one or more leases to
services for the process when resuming execution of the process;

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converting the one or more objects into data representation language
representations of the one or more objects; and

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including the data representation language representations of the one or
more objects in the data representation language representation of
the current computation state of the process, wherein the data
representation language representations of the one or more objects
are configured for use in generating copies of the one or more
objects.

65. The carrier medium as recited in claim 61, wherein the process is executing within a first virtual machine executing within the first device, and wherein the process is reconstituted and execution is resumed within a second virtual machine executing within the second device.

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66. The carrier medium as recited in claim 61, wherein said data representation language is eXtensible Markup Language (XML).

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